

Application No. 10/026,020  
Amendment dated April 4, 2005  
Reply to Final Office Action mailed November 3, 2004

### **AMENDMENTS TO THE CLAIMS**

*The listing of claims will replace all prior versions and listings of claims in the application:*

#### **Listing of Claims:**

1.     **(Currently Amended)**     A vertical cavity surface emitting laser (VCSEL), comprising:  
  
          an active region further comprising at least one quantum well having a depth of at least 40 meV, wherein said depth is defined using the difference between a valence band offset and a conduction band offset, said quantum well being comprised of InGaAsSb and barrier layers sandwiching said at least one quantum well; and  
  
          confinement layers sandwiching said active region; and  
  
          a compressively strained flattening layer sandwiched between a lower confining layer and the active region and that flattens a surface on which the active region is formed.
2.     **(Original)**     The VCSEL of claim 1 wherein said barrier layers are comprised of GaAsN.
3.     **(Original)**     The VCSEL of claim 1 wherein said barrier layers are comprised of GaAsP.
4.     **(Original)**     The VCSEL of claim 1 wherein said barrier layers are comprised of AlGaAs.
5.     **(Original)**     The VCSEL of claim 1 wherein said confinement layers are comprised of AlGaAs.

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6.     **(Original)**     The VCSEL of claim 1 wherein said quantum well is up to and including 50Å in thickness.

7.     **(Original)**     The VCSEL of claim 2 wherein said confinement layers are comprised of AlGaAs.

8.     **(Original)**     The VCSEL of claim 7 wherein said quantum well is up to and including 50Å in thickness.

9.     **(Original)**     The VCSEL of claim 3 wherein said confinement layers are comprised of AlGaAs.

10.    **(Original)**     The VCSEL of claim 9 wherein said quantum well is up to and including 50Å in thickness.

11.    **(Original)**     The VCSEL of claim 4 wherein said confinement layers are comprised of AlGaAs.

12.    **(Original)**     The VCSEL of claim 11 wherein said quantum well is up to and including 50Å in thickness.

13.    **(Previously Presented)**     The VCSEL of claim 1 wherein said at least one quantum well further comprises >1% N.

14.    **(Original)**     The VCSEL of claim 13 wherein said quantum well is up to and including 50Å in thickness.

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15.     **(Original)**     The VCSEL of claim 13 wherein said barrier layers are comprised of GaAsN.

16.     **(Original)**     The VCSEL of claim 15 wherein said quantum well is up to and including 50Å in thickness.

17.     **(Original)**     The VCSEL of claim 13 wherein said barrier layers are comprised of GaAsP.

18.     **(Original)**     The VCSEL of claim 17 wherein said quantum well is up to and including 50Å in thickness.

19.     **(Original)**     The VCSEL of claim 13 wherein said barrier layers are comprised of AlGaAs.

20.     **(Original)**     The VCSEL of claim 19 wherein said quantum well is up to and including 50Å in thickness.

21.     **(Original)**     The VCSEL of claim 13 wherein said confinement layers are comprised of AlGaAs.

22.     **(Original)**     The VCSEL of claim 21 wherein said quantum well is up to and including 50Å in thickness.

23.     **(Original)**     The VCSEL of claim 15 wherein said confinement layers are comprised of AlGaAs.

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24. **(Original)** The VCSEL of claim 23 wherein said quantum well is up to and including 50Å in thickness.

25. **(Previously Presented)** The VCSEL of claim 17 wherein said confinement layers are comprised of AlGaAs.

26. **(Original)** The VCSEL of claim 25 wherein said quantum well is up to and including 50Å in thickness.

27. **(Original)** The VCSEL of claim 19 wherein said confinement layers are comprised of AlGaAs.

28. **(Original)** The VCSEL of claim 27 wherein said quantum well is up to and including 50Å in thickness.

Claims 29. – 44 **(Cancelled)**.

45. **(Previously Presented)** A vertical cavity surface emitting laser (VCSEL), comprising:

an active region further comprising at least one quantum comprised of material including InGaAsSb and greater than 1 % nitrogen, said at least one quantum well having a depth of at least 40 meV, wherein said depth is defined using the difference between a valence band offset and a conduction band offset, and barrier layers sandwiching said at least one quantum well; and

confinement layers sandwiching said active region; and  
a compressively strained flattening layer sandwiched between a lower confining layer and the active region and that flattens a surface on which the active region is formed.

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46. **(Previously Presented)** The VCSEL of claim 45 wherein said barrier layers are comprised of GaAsN.

47. **(Previously Presented)** The VCSEL of claim 45 wherein said barrier layers are comprised of GaAs and at least one of P and Al.

48. **(Previously Presented)** The VCSEL of claim 45 wherein said confinement layers are comprised of AlGaAs.

49. **(Previously Presented)** The VCSEL of claim 46 wherein said confinement layers are comprised of AlGaAs.

50. **(Previously Presented)** The VCSEL of claim 47 wherein said barrier layers are comprised of AlGaAs.

51. **(Previously Presented)** The VCSEL of claim 48 wherein said barrier layers are comprised of GaAsN.

52. **(Previously Presented)** The VCSEL of claim 48 wherein said barrier layers are comprised of GaAs and at least one of P and Al.

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**53. (Currently Amended)** A vertical cavity surface emitting laser (VCSEL), comprising:

an active region further comprising at least one quantum comprised of material including InGaAsSb and greater than 1 % nitrogen, said at least one quantum well having a depth of at least 40 meV, wherein said depth is defined using the difference between a valence band offset and a conduction band offset, said quantum well including thickness up to and including 50A, and barrier layers sandwiching said at least one quantum well; and

confinement layers sandwiching said active region; and  
a compressively strained flattening layer sandwiched between a lower confining layer and the active region and that flattens a surface on which the active region is formed.

**54. (Previously Presented)** The VCSEL of claim 53 wherein said barrier layers are comprised of GaAsN.

**55. (Previously Presented)** The VCSEL of claim 53 wherein said barrier layers are comprised of GaAs and at least one of P and Al.

**56. (Previously Presented)** The VCSEL of claim 53 wherein said confinement layers are comprised of AlGaAs.

**57. (Previously Presented)** The VCSEL of claim 54 wherein said confinement layers are comprised of AlGaAs.

**58. (Previously Presented)** The VCSEL of claim 55 wherein said confinement layers are comprised of AlGaAs.

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59. **(Previously Presented)** The VCSEL of claim 56 wherein said barrier layers are comprised of GaAs and at least one of N, P and Al.